

FIGURE OM1. Location of the Dongsheng uranium deposit in the context of the depositional system tract of the lower parasequence set (J2z1-1) of the Zhiluo Formation (modified after Yue et al. 2020). This map shows the position of the cross section presented in Fig. 2.

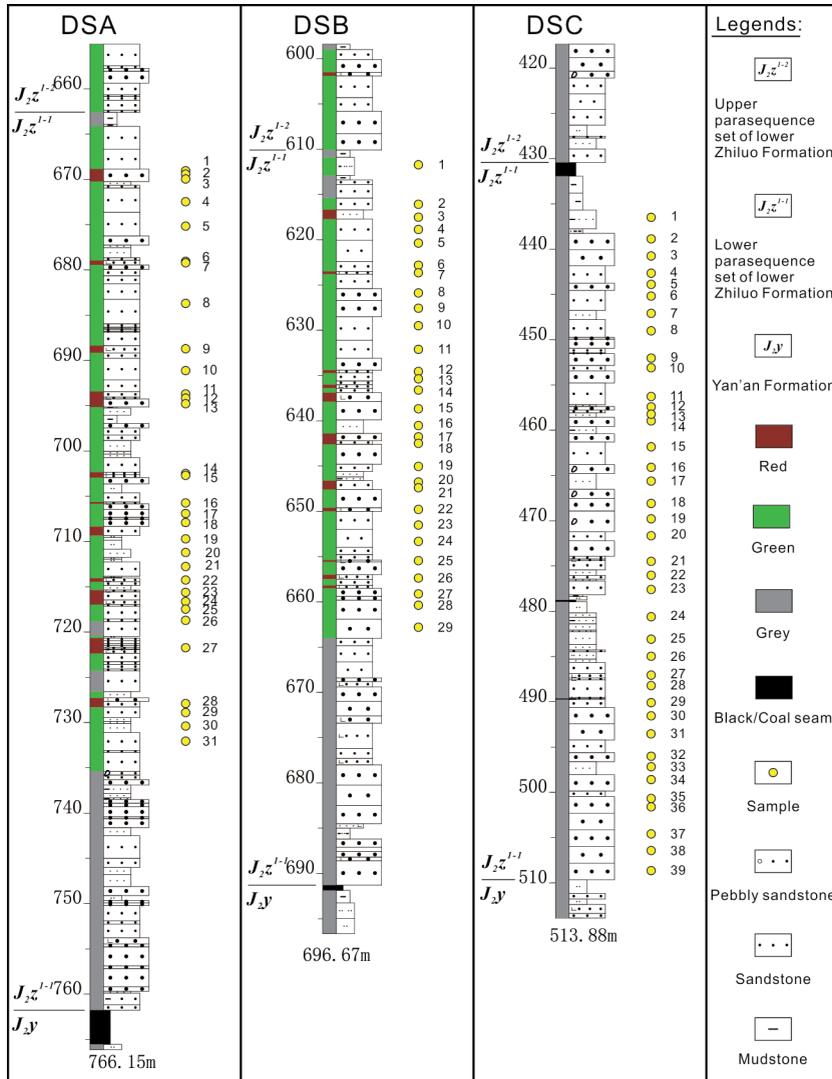


FIGURE OM2. Location of samples from three drill holes (DSA, DSB and DSC).

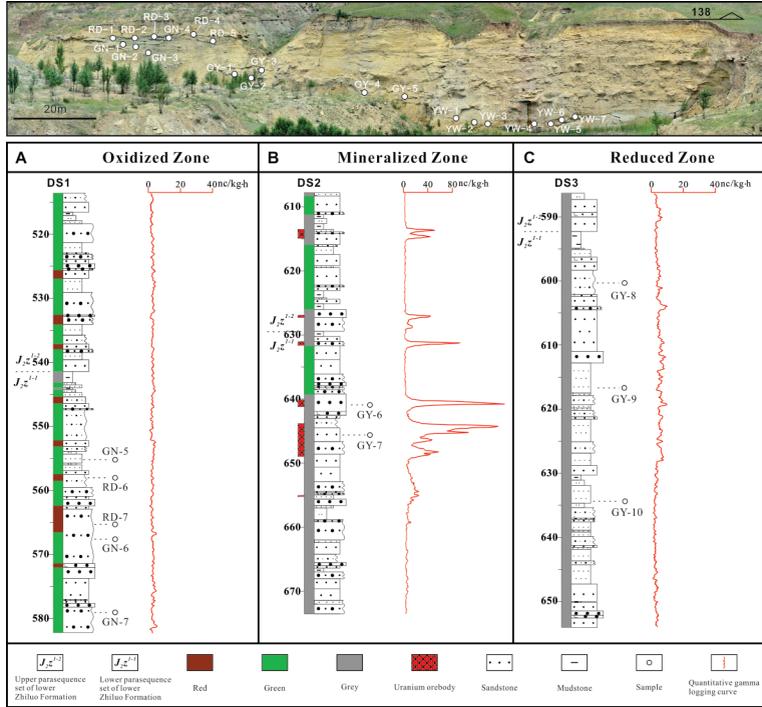


FIGURE OM3. Location of samples from outcrop in the Shenshangou area and three drill holes (DS1, DS2 and DS3).

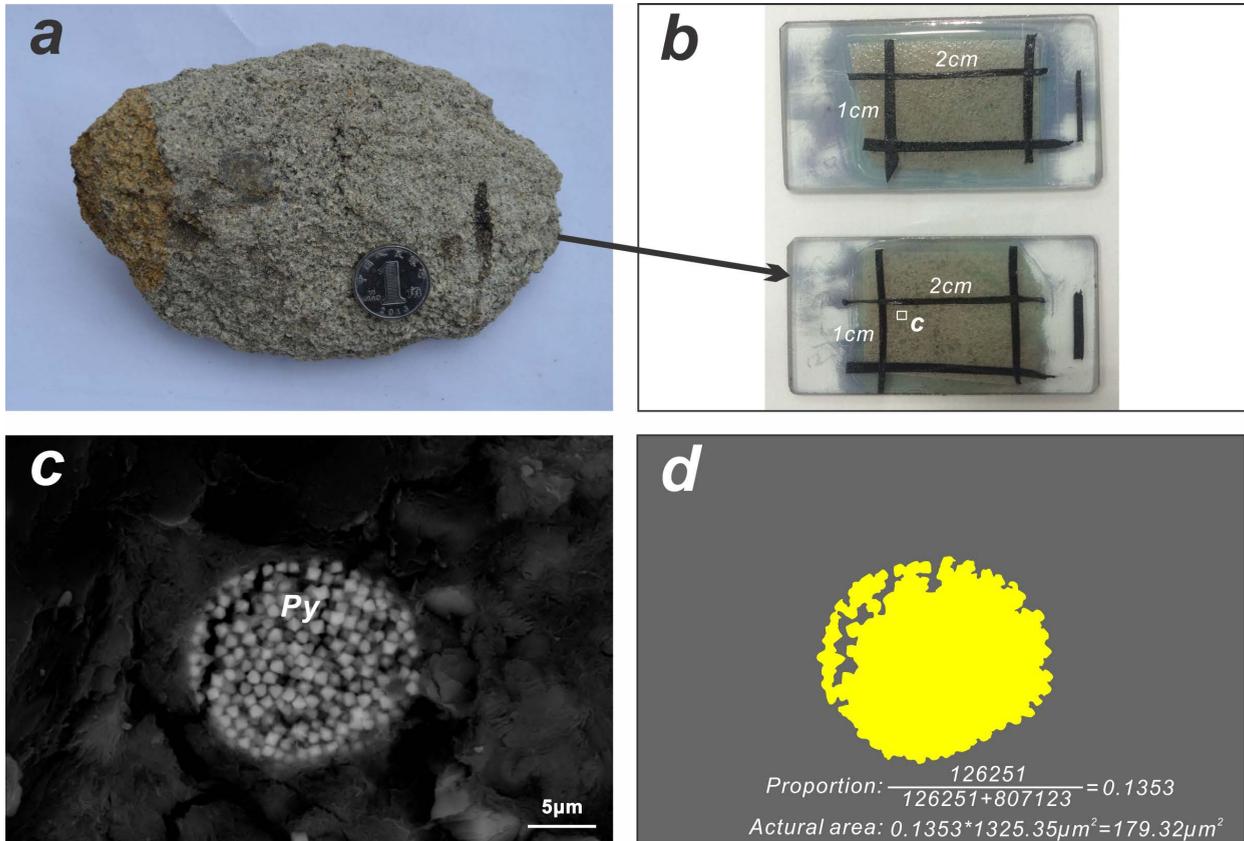


FIGURE OM4. Statistical method of sectional areas of pyrite within a 2 cm² area. (a) Mineralized, gray sandstone from outcrop in the Shenshangou area, sample GY-3; (b) Thin sections marked with a 2 cm² area; (c) Back-scattered electron image showing framboidal pyrite; (d) Sectional area of pyrite calculated by using the software named Image-Pro Plus 6.0. Abbreviations: Py = pyrite.

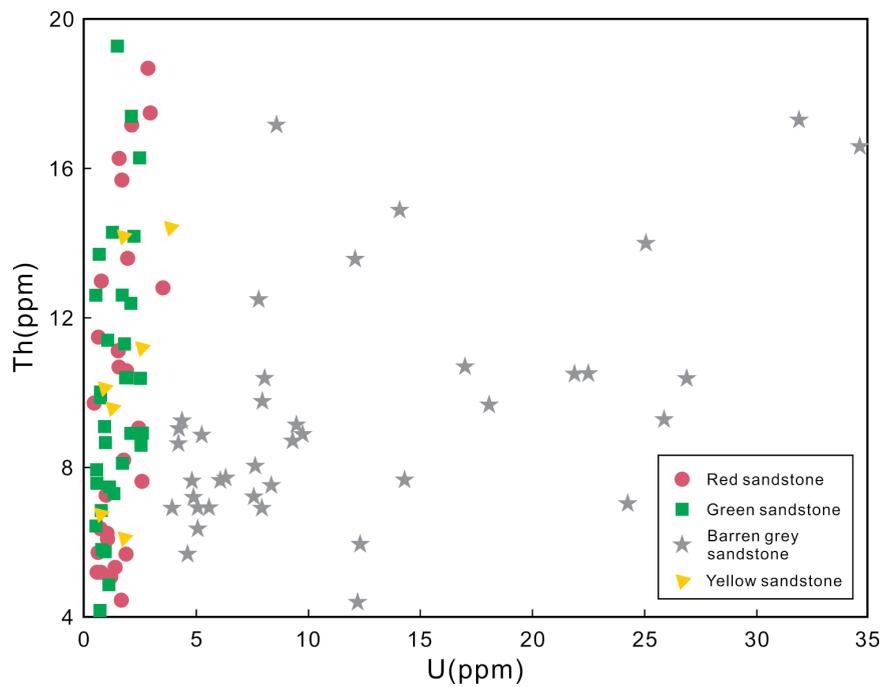


FIGURE OM5. Th vs. U diagram showing high U contents in barren grey sandstones.

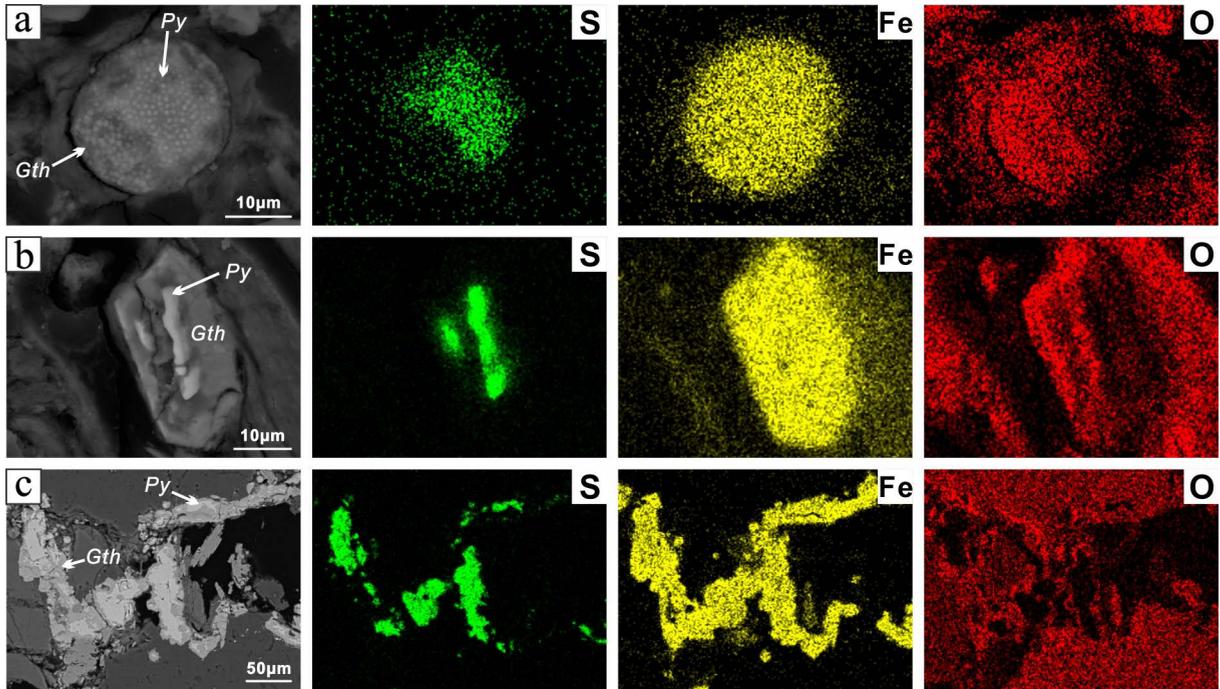


FIGURE OM6. Back-scattered electron images along with energy-dispersive spectroscopy element mappings of S, Fe and O for different morphological pyrite and their oxide. (a) Goethite occurring as rims around cores of framboidal pyrite, sample YW-2; (b) Goethite occurring as rims around cores of euhedral pyrite, sample YW-4; (c) Goethite occurring as rims around cores of pyrite cement, sample YW-1. Abbreviations: Gth = goethite, Py = pyrite.

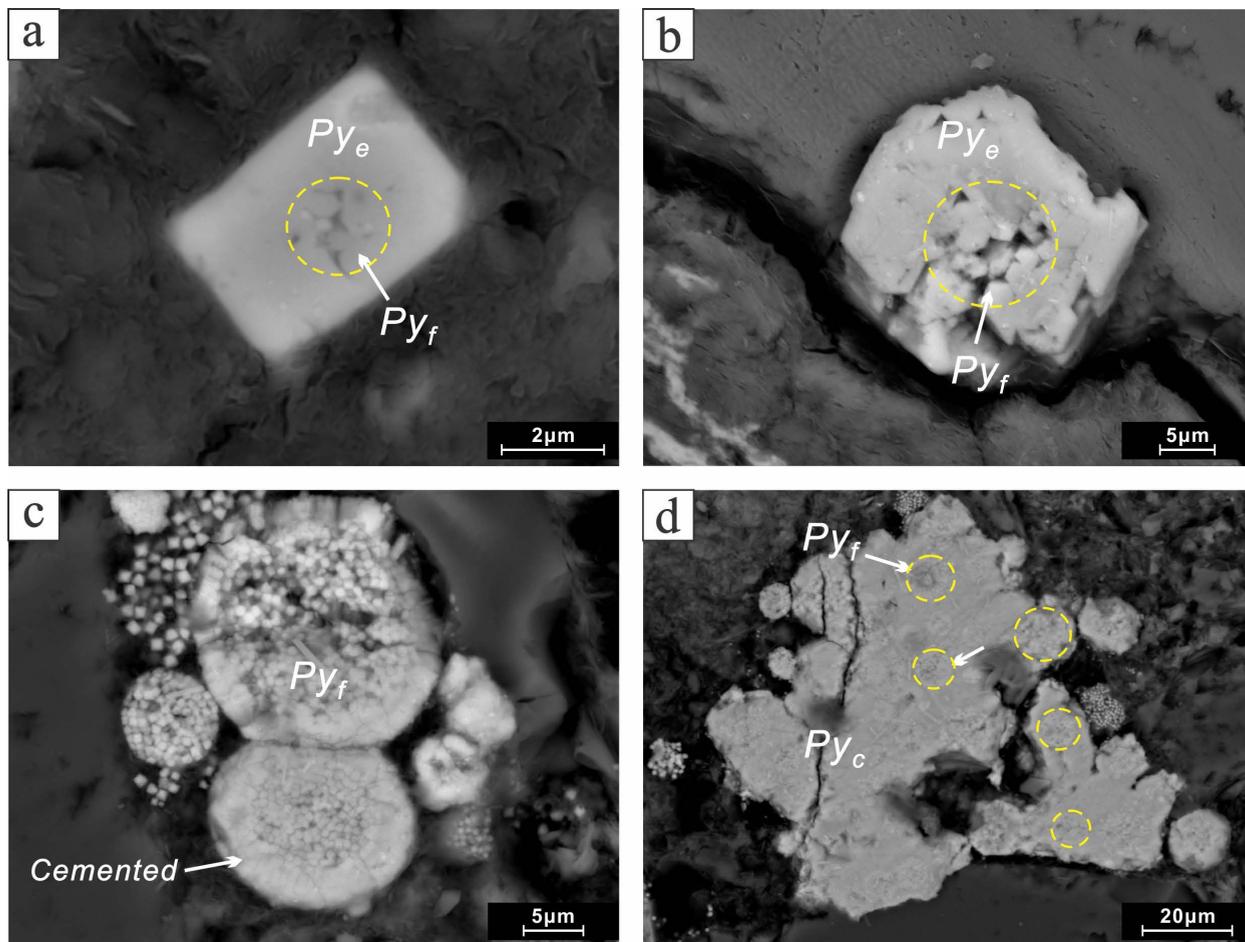


FIGURE OM7. Back-scattered electron images showing the framboidal pyrite overprinted by euhedral pyrite (a, b) and pyrite cement (c, d) in grey sandstones (modified from Yue et al. 2020). Abbreviations: Pyc = pyrite cement, Pye = euhedral pyrite, Pyf = framboidal pyrite.

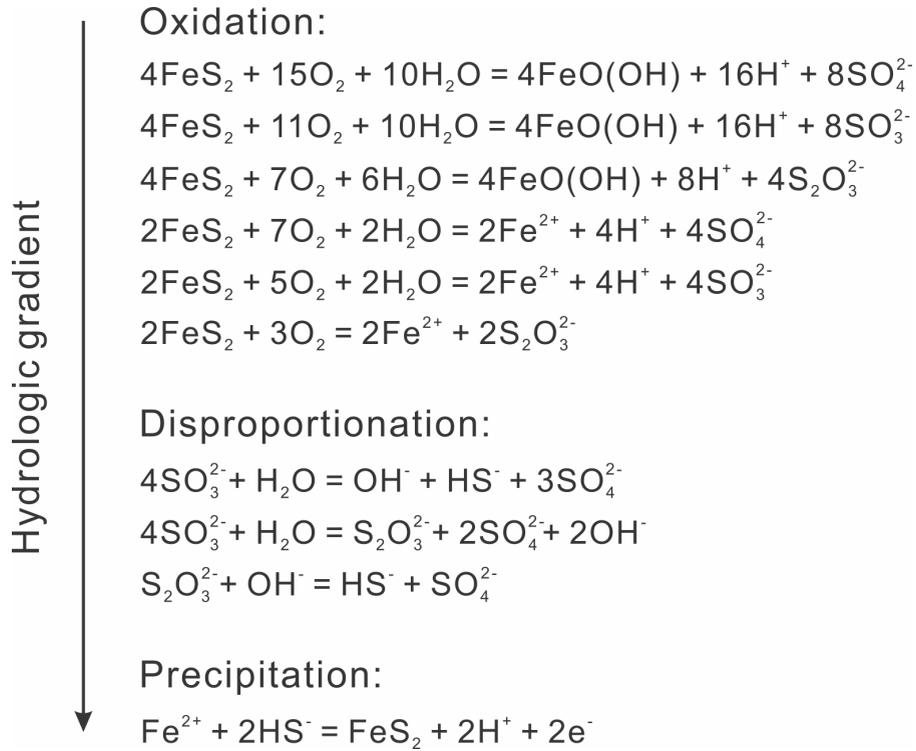


FIGURE OM8. Abiogenic redox model delineating step-wise chemical reactions in neutral to basic pH (adapted from Granger and Warren 1969; Hough et al. 2019).

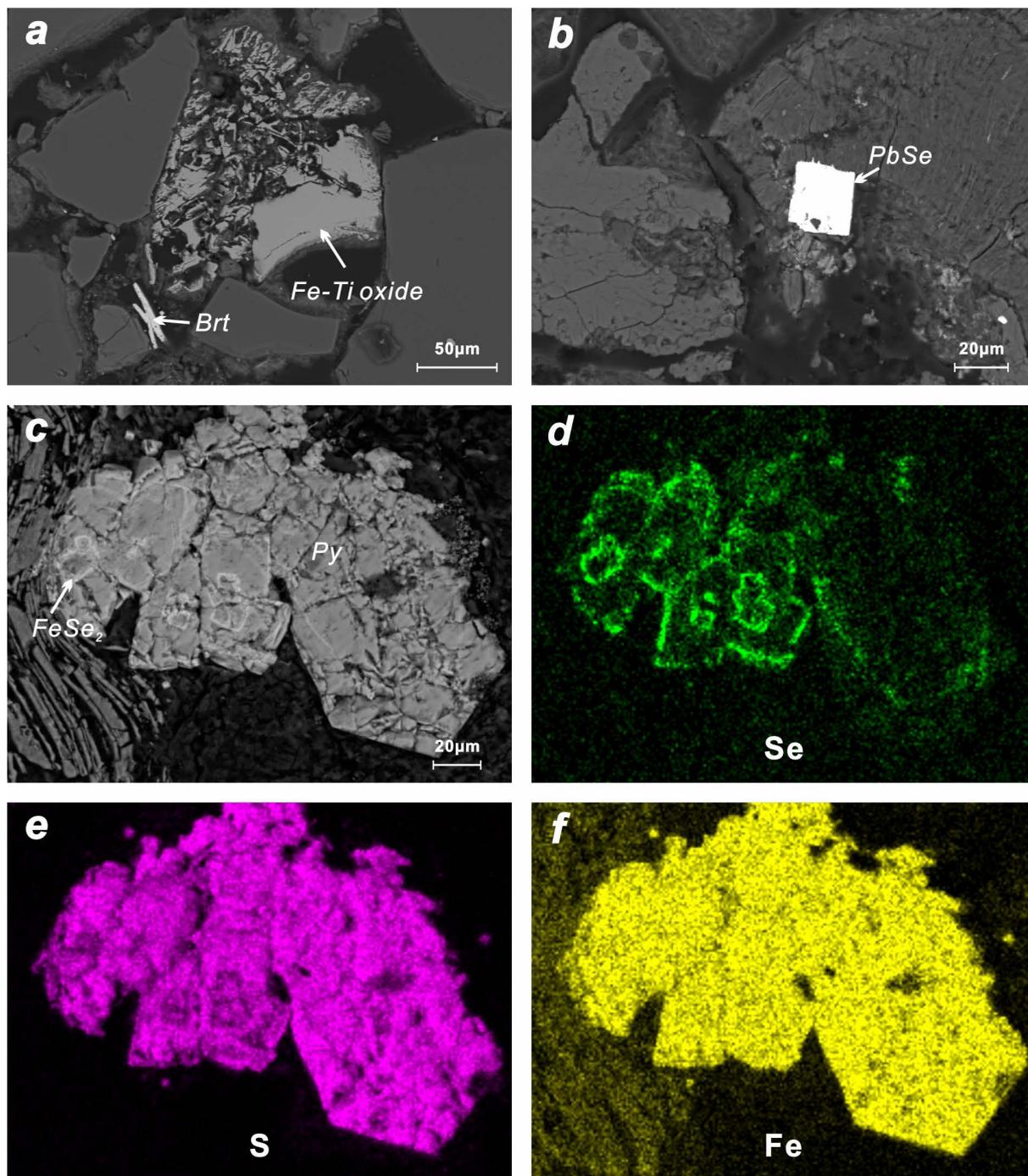


FIGURE OM9. Back-scattered electron images along with energy-dispersive spectroscopy element maps showing occurrences of barite (a), clausthalite (b), ferroselite and pyrite (c-f). Abbreviations: Brt = barite, Py = pyrite.

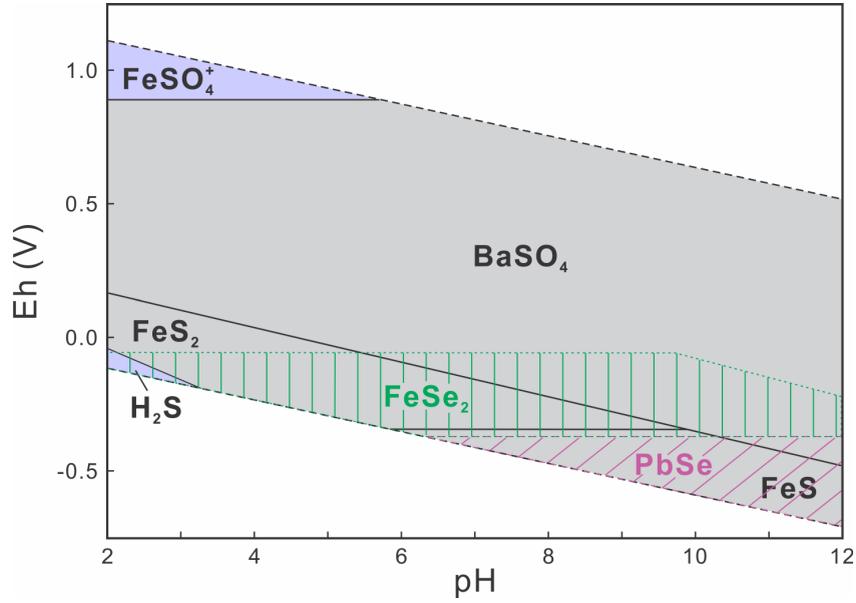


FIGURE OM10. Eh-pH diagram of sulfur and selenium phases (adapted after Hough et al. 2019). Solid phases indicated in gray; aqueous phases indicated in blue. Ferroselite stability field is outlined with the dashed green line, and clausthalite stability field is outlined with the dashed red line. Modeled on Geochemist Workbench 11.0.2: temperature = 25 °C, pressure = 1 atm, $\text{Fe}^{2+} = 10^{-3}$ M, $\text{Ba}^{2+} = 10^{-6}$ M, $\text{Se} = 10^{-5}$ M, $\text{S} = 10^{-3}$ M.